REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1, 4, 7, 9, 16, 23, 27 and 29-37 are pending in the present application. Claims 2, 3, 5, 6, 8, 10-15, 17-22, 24-26 and 28 have been canceled without prejudice, Claims 1, 7, 9, 23 and 27 have been amended, and Claims 29-37 have been added by the present amendment.

In the outstanding Office Action, Claims 1, 9 and 27 were rejected under 35 U.S.C. § 103(a) as unpatentable over Steinbach et al in view of Wixson. This rejection is respectfully traversed.

Claim 1 is directed to an image recognition method in which a deformed image is obtained by three-dimensionally deforming a captured range image having three-dimensional information including depth information of an object to be sensed, which is supported in the originally filed specification at least in Figure 6, at page 18, line 20 to page 19, line 15, and at page 19, lines 18-26. Independent Claims 9 and 27 include similar features.

In a non-limiting example, Figure 6 shows an example of a range image of a hand captured by an image capture section 1. The range image is a three-dimensional image having depth information, and is defined by, e.g., 64 pixels in the x-axis (horizontal) direction, 64 pixels in the y-axis (vertical) direction, and 256 grey levels in the z-axis (depth) direction (see page 18, line 20, to page 19, line 15).

As an advantage, the range image is actually three-dimensionally rotated, and recognition is done using that three-dimensional information, unlike the conventional recognition method for estimating three-dimensional rotation based on two-dimensional information from a two-dimensional image. For this reason, recognition can be done more reliably and stably than the conventional method (see the specification at page 27, lines 6-16).

Further, because the deformed image is generated in real time, and is used as a template image, no template image need be prepared in advance, and memory resources or the like need not be wasted, thus allowing efficient processing (see the specification at page 27, lines 19-24).

In contrast, Steinbach et al merely discuss that points inside a shape are acquired based on the change in shape inside an image due to motion of an object from a reference image (for example, an image of a proceeding frame) to a current image (see Figure 2 of Steinbach et al). Further, as indicated in the outstanding Office Action, Steinbach et al discuss recognizing 3D motion of an object in a range image merely by comparing two images, unlike the method of the independent claims, in which a range image has three-dimensional information. Moreover, as indicated in the outstanding Office Action, Steinbach et al do not teach or suggest three-dimensionally deforming an image; therefore, the method of Steinbach et al has no relationship to deforming an image and does not teach or suggest the features of the independent claims.

In addition, Wixson only describes "warping" using information from two images, and Steinbach et al only describes calculating a motion parameter using information of two images. Thus, the combination of Wixson and Steinbach et al only describes deformation of an image using information from two images. Accordingly, the combination of Steinbach et al and Wixson does not teach or suggest recognition of motion information by preparing a three-dimensionally deformed image using data of only one image, and then comparing the three-dimensionally deformed data with another image, as in the independent claims.

Moreover, the system of Wixson uses two-dimensional optical flow, which is necessarily limited to two-dimensional flow fields (see column 3, lines 14-34 of Wixson). Therefore, Wixson does not teach or suggest a range image having three-dimensional information including depth information, as in the independent claims.

Further, Steinbach et al and Wixson utilize a value of color information of an object to be sensed, in contrast to the system of the independent claims which includes depth information of an object to be sensed.

Accordingly, neither Steinbach et al nor Wixson teach or suggest using three-dimensional deformation of a captured range image having three-dimensional information including depth information, as in the independent claims, and it is respectfully submitted independent Claims 1, 9 and 27 and each of the claims depending therefrom patentably distinguish over Steinbach et al and Wixson.

Further, non-elected Claims 2, 3, 5, 6, 8, 10-15, 17-22, 24-26 and 28 have been canceled and Claims 7 and 23 have been amended to correct minor grammatical informalities and to better conform to U.S. claim drafting practice. It is believed no new matter has been added.

In addition, new Claims 29-37 have been added to set forth the invention in a varying scope. New Claims 29, 32 and 35 include features of a rotated deformed image, which is supported in the originally filed specification at least at page 19, lines 18-26. New Claims 30, 33 and 36 include features of moving a deformed image in parallel, which is supported in the originally filed specification at least at page 37, lines 19-25. New Claims 31, 34, and 37 include features of contracting a deformed image by rotation, which is supported in the originally filed specification at least at page 37, lines 3-9. It is believed no new matter has been added.

Consequently, in light of the above discussion and in view of the present amendment, this application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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